Planning Concepts for
Sonoma Clean Power's
Local Energy Resources Development

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Executive Summary

This Local Energy Resources Development Planning Concepts document builds on previous work in Sonoma County to identify and plan for the development of local (in-county) energy resources. It is intended to accelerate evaluation of the policies, programs, and financial mechanisms that may be employed by Sonoma Clean Power.

Sonoma County is endowed with substantial local primary energy sources including the Geysers geothermal field, ample sunshine, coastal wind and wave energy, and biomass. Sonoma County also possesses the intellectual capacity to make use of these resources in appropriate deployments that are comprehensively integrated in order to maximize the potential benefit of each source.

This document asserts that localization of energy resources brings multiple benefits. A core premise is that a community is more energy secure when it controls more of its own energy resources and obtains more of its energy from locally-based generation. By localizing its energy portfolio with varied, intelligent, communicating renewable sources it reduces its dependence on volatile fossil energy prices and is less vulnerable to storm damage or targeted attacks on the long, highly vulnerable transmission and distribution lines of the present grid.

The ability to deploy a given resource often hinges on applying the right financing mechanism to achieve cost-effectiveness and risk minimization to customers and SCP.

The question of ownership of energy assets is a critically important strategic aspect of resource planning. In some cases it may make sense for Sonoma Clean Power to own a generation asset; however, generation assets can become stranded as technology improves and market conditions change. Much of the work of Sonoma Clean Power will be to serve as a catalyst for private sector development of efficiency and generation assets. If SCP is to buy assets, it must buy smart and avoid long term commitments that expose SCP to departing load.

The energy localization concept includes the aim of local capital retention, achieved by arranging financing for distributed energy resource (DER) assets from local banks and funds that in many instances keeps ownership of the energy assets inside the County.

The optimal role of Sonoma Clean Power is to be an energy services provider that focuses on DER, and not as a wholesale buyer/retail seller of power. A key concept is the distinction between local generation resource development and development of

DER. Local generation resource development often employs utility scale projects that utilize the transmission and/or distribution (T&D) grid and costs associated with T&D. DER development emphasizes energy efficiency, intelligence, and behind the meter deployments that avoid transmission and distribution costs, and also can be structured to avoid ownership and debt risks.

To incorporate DER, SCP faces a complex multidimensional puzzle where cost, system integration, financing, technology, and other factors must be woven together successfully to produce optimal results. SCP will need to have staff capable of interacting with expertise in the public and private sectors to orchestrate the complexities.

The document recognizes that the electricity sector is a rapidly changing, dynamic field with many new technology, legislation, regulation, and market forces combining to upend the current system. CCAs can play a vital role in catalyzing the transformation of the electricity sector to cleaner, decentralized, cheaper, smarter energy systems.

1. Introduction

This Local Energy Resources Development planning document describes a package of tools to achieve the maximum and earliest possible deployment of energy efficiency and renewable energy in Sonoma County under Sonoma Clean Power.[1] The document is limited in scope and does not attempt to address all aspects of Sonoma Clean Power's operations, but is meant to serve as a starting point for discussion about the innovative programs that SCP might promulgate.

Sonoma Clean Power presents significant opportunities for Sonoma County residents, businesses, and policymakers. It can make the best of both public institutional tools as well as market forces that can rapidly accelerate clean energy development and drive down energy costs when the necessary policies are in place.

The Intergovernmental Panel on Climate Change[2] has set 2040 as the "hard stop" where significant reductions in greenhouse gases (GHGs) must be met. This document summarizes a set of actions whereby Sonoma Clean Power (SCP) achieves 100% local renewable energy by the year 2030. The target date of 2030 is chosen in order to allow ten years for other communities to adopt proven localization programs, and because

[1] http://www.sonomacleanpower.org/

[2] http://www.ipcc.ch/

Sonoma Clean Power is one of the very few entities in the State with the ability to demonstrate a profitable route off of fossil fuels

In 2006 the state of California enacted the Global Warming Solutions Act, also known as AB32, that requires the state to reduce greenhouse gas emission to 1990 levels by the year 2020. This document points a way for, Sonoma County to exceed AB32's emission reduction goal. In addition, by integrating the electrification of the transportation system into the policies and programs of SCP, measurable GHG reductions in the transportation sector and economic benefits will be gained for SCP customers.

This document builds on a foundation of analyses and studies aimed at identifying and developing Sonoma County energy resources. Some of this past work includes the Sonoma County Community Climate Action Plan[3] (2008), the Sonoma County Renewable Energy Secure Communities (RESCO) project[4] (2009-2013), and the community choice aggregation Feasibility Study[5] (2011).

The essence of this planning document is the localization of energy resources. That means thousands of energy efficiency retrofits and renewable energy installations. Many stakeholders will be engaged to make this happen including labor, property owners, renewable energy project developers, and contractors. This work provides an economic stimulus to Sonoma County.

1.1. Vision

The vision is that by 2030 the Sonoma County community has achieved the goals put forward in the founding documents of Sonoma Clean Power, and has transformed its energy system to one that is environmentally, economically, and socially sustainable. The system derives 100% of its power from local renewable sources, is optimized by real-time software intelligence that enables distributed energy resources and many participants to engage in a more democratic energy paradigm. The system is capable of operating as a self-sufficient energy island, and benefits by selling surplus energy to others outside of Sonoma County. Communities throughout the U.S. replicate Sonoma Clean Power's programs and policies, and greenhouse gas reductions and other benefits amplify significantly.

[3] http://www.coolplan.org/

[4] Renewable Energy Secure Communities report http://www.sonomaresco.org/ The report can be found in the "library" tab on the left

[5] Scroll to the bottom of the page: http://www.sonomacleanpower.org/app_pages/view/21

1.2. Purpose

The purpose of this document is to present a summary of the local energy resources available to SCP and to examine near, mid, and long term resource development programs that may be employed to localize Sonoma County's energy portfolio and ultimately achieve a 100% clean, local energy portfolio at costs below either remote clean or remote fossil.

This planning document is intended to help inform the development of the Sonoma Clean Power Resources Plan, also known as the Strategic Plan, and is conceived as a living document, subject to periodic revision based on ever-changing costs, technology advancements, and other factors.

This document aims to help achieve the founding purposes outlined in the Sonoma Clean power Joint Powers Agreement[6], which aim to:

- Reduce greenhouse gas emissions related to the use of power in Sonoma County and neighboring regions;
- Provide electric power and other energy services to customers at market leading cost;
- Successfully implement programs to reduce energy consumption;
- Stimulate and sustain the local economy by developing local jobs in energy efficiency and renewable energy; and
- Promote long-term electric rate stability and energy security and reliability for residents through local control of electric generation resources.[7]

1.3. Approach

The general approach of this document is to utilize community choice aggregation as a vehicle for dramatically accelerating energy efficiency, energy storage and renewable energy deployment. The localization of energy is a driving principle.

Energy resources available within Sonoma County are presented with brief descriptions and capacity estimates. A 2030 resource-based graph is provided that indicates the portion of the portfolio each resource delivers.

Special attention is paid to optimal sequencing of the initiation and implementation of programs. Several aspects of integration are identified: 1) integration of two or more

[6] http://www.sonomacleanpower.org/files/managed/Document/174/SCPA%20Second%20Amended%20Joint%20Powers%20Agreement%20Approved%207-25-13.pdf

[7] http://www.sonomacleanpower.org/files/managed/Document/174/SCPA%20Second%20Amended%20Joint%20Powers%20Agreement%20Approved%207-25-13.pdf

programs with each other, 2) integration of wholesale power purchase plans with distributed energy resources, 3) integration of various energy resource types, 4) integration of SCP programs with external factors.

The optimal value of Sonoma Clean Power is to be an energy services provider that focuses on distributed energy resources, and not as a wholesale buyer/retail seller of power. In its early days, SCP must contract for its electricity from existing Electricity Service Providers. However, SCP is not only about feeding cleaner power into the existing energy system; it is about participating in the global energy transformation that is underway by catalyzing the acceleration of the development of local clean energy resources – the localization of energy.

This document describes how SCP can serve as the catalyst to transform the grid so that power can be shared laterally among many participants quickly, easily, efficiently, equitably, and cost-effectively. It emphasizes the value of applying real time intelligence and communication to all systems, thereby forging a path to a future system that includes automation and demand control where beneficial. Intelligence enables deep efficiencies and a fundamental transformation in the way customers interface with their energy service provider and with the energy systems they use in their lives.

An assumption underlying this document is that local clean energy will continue falling in cost, as it has been recently. It also addresses the debatable assertion that local clean energy is more expensive than remote fossil energy, as well as the challenge of customers with their own generation departing from the revenue base, a challenge that can impact SCP as it does the Investor Owned Utilities.

The document also recognizes the need for customer-secured, as distinct from ratepayer-based, cost-effective financing structures to be applied throughout SCPs' suite of energy products so that risk to SCP is reduced.

1.4 Key Considerations

The SCP opportunity space is not unlimited
SCP will only be able to pay for power that it can afford. SCP's resources are limited by revenue it receives from its customers. Further, SCP will only be able to purchase power at a price that enables it to then sell to its customers at a competitive rate. What this means is that project developers and anyone considering selling power to SCP via a feed-in-tariff, will need to understand that there will be limits to what SCP can do and still remain financially sound.

SCP operates in a competitive environment

It is known that the incumbent utility plans to introduce programs that are designed to compete directly with CCAs in its service territory. Such proposed programs include a 100% green power option. SCP's programs will need to offer something more than what the IOU offers. Further, competition is increasing from large statewide and nationwide solar installers that mass-market cookie cutter solar installations financed via power purchase agreements that allow customers to have solar panels on their roof with no upfront cost. SCP will also need to find ways to compete with that reality.

2. Distributed Energy Resources

Below is a list of some of the distributed energy resources (DER) and non-distributed renewable generation available in Sonoma County.[8] The technical capacity for any one of these resources is greater than what is presented here. Limiting factors include financial, social, political and aesthetic concerns. The estimated quantities are from the RESCO report, portfolio #3, and are used for the purposes of presenting an indication of what might be achievable. For greater detail on each resource, see the Task 5 Report of that project. The idea is to provide a starting point for comprehensive discussion. The list is not limited to the resources presented in the RESCO report.

2.1 Resource Descriptions

- Solar Photovoltaics
  Solar photovoltaic power is the primary decentralized generation source that SCP can accelerate via the right policies, ideally coupled with storage. The RESCO Report estimates 85 MW of new capacity by 2020.
- Geothermal
  SCP is ideally situated to benefit from the proximity of the Geysers geothermal field. The power purchase agreement signed in the fall of 2013 is a good beginning. 98 MW of new permitted capacity exists at the Geysers. The RESCO Report estimates that about 70 MW might be obtained from the Geysers by 2020.
- Wind
  Sonoma County is not a very windy county. Although there are several moderate to good onshore locations, the best resource is off the coast. The RESCO Report estimates obtaining about 25 MW of windpower by 2020.
- Biomass
  Sonoma County is an agricultural county. Crop residues and animal manure may be harnessed along with the organic fraction of municipal solid waste in

[8] For a complete list of RPS-eligible supply side resources visit: http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm

anaerobic digesters to produce methane that can then be used to generate electrical power. The RESCO Report estimates that about 30 MW can be obtained by 2020.

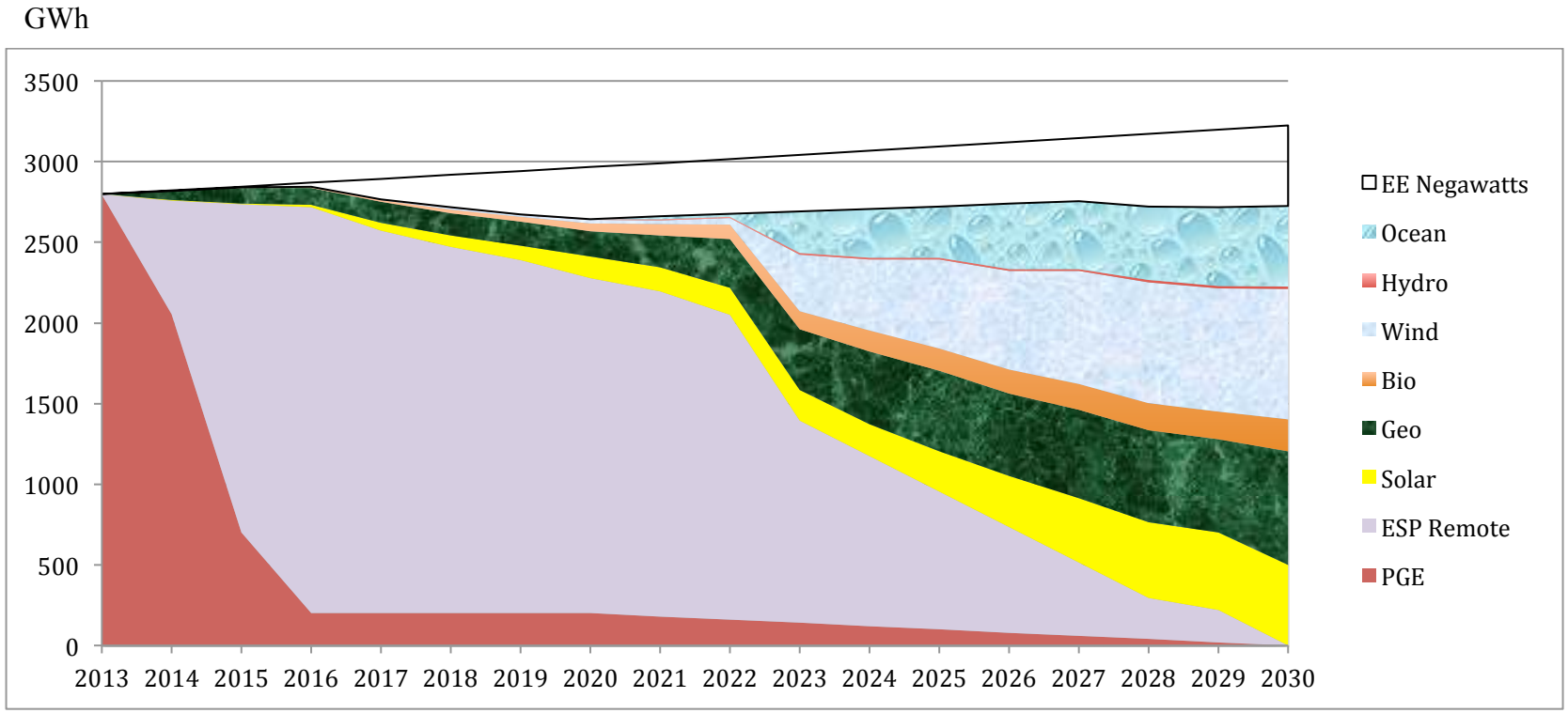
- Ocean Energy Systems
  Abundant wave and marine current energy resources exist off Sonoma County's coast. Some of this energy may be harnessed in the 2020-2030 timeframe.
- Small Hydroelectric Power
  The Warm Springs Dam[9] is currently the only utility scale hydropower generation in Sonoma County. According to Idaho National Lab's Virtual Hydropower Prospector, there are dozens of low-power conventional, low-power unconventional, and micro-hydro sites to be developed in Sonoma County.[10]
- Energy Efficiency
  Energy efficiency is a form of conservation where equivalent service is derived from a given technology, e.g. light bulb, but using less energy. The RESCO Report estimates that about 142 Negawatts can be obtained by 2020.
- Intelligence
  In the context of this document, when the term "intelligence" is used, it refers to the application of software, communications and digital control to electrical systems, the smart-grid or microgrid aspect of energy services. The key elements are automated demand response, automated generation control and demand side management.
- Storage – Although legislation mandates storage capacity equal to 1% of SCP's peak load be developed by 2020, SCP will have an interest in developing far more than that prior to 2020 in order to accommodate aggressive intermittent renewables deployment.

Resources other than those strictly related to electricity generation should be considered. Combined heat and power, for example, is a key GHG reduction measure as well as a foundational technology for an ambitious energy localization program. Solar hot water is similarly a cost-effective GHG reduction measure, is subsidized by the state, and may offset electrical usage in rural areas where natural gas service does not extend.

[9] http://www.spn.usace.army.mil/Missions/Recreation/LakeSonoma.aspx
[10] http://gis-ext.inl.gov/vhp/Default.aspx

2.2 Resource-based Speed & Scale Graph

The following graph is meant to offer a conceptual view of the change in Sonoma County's local resource portfolio over time. As in any projection about possible future scenarios, this graph is not meant as a prediction, but as merely indicative of what might emerge. The vertical axis is load in gigawatt-hours, the horizontal axis is time in years extending out to the year 2030. The early years reflect known aspects of SCP rollout phases and the purchase of Geysers geothermal power. Note that EE Negawatts subtracted from the total load. This graph does not take into account the potential significant load increase from electric vehicle adoption.



3. Resource Development Programs[11]

The options and resources available to SCP have continued to evolve and improve since SCP was in its planning stages. Indeed, changes within the past year alone have greatly increased the resources and options available, not only to SCP's effective launch on the procurement side, but also to the next generation of SCP programs in such areas as intelligent grid, creative demand response programs, community project initiatives, storage, and transportation.

The first six of the programs below are already in the Implementation Plan for SCP and some are already in the process of being designed and implemented. The following eleven programs are presented for consideration, as integrated with the first six programs, other SCP program elements, and wholesale electric purchases.

Existing or planned programs

3.1 EverGreen Program

The most salient characteristic of the EverGreen program is that it is designed for a segment of the population willing to be proactive and pay more than the average customer to reduce the use of fossil power.

The EverGreen program to be offered at the launch of SCP will deliver 100% local renewable energy from the Geysers. A Phase 2 effort for SCP will be to design an EverGreen program that leads directly to the development of new local distributed energy resources by making use of many of the development programs outlined below.

3.2 Net Energy Metering Rate

As described in the SCP Implementation Plan, Net Energy Metering (NEM)[12] customers with on-site generation eligible for net metering from PG&E will be offered a NEM rate from SCP.

AB 327 enacted in 2013 will revise the net metering law. The following assumes current rules for existing NEM customers, and pending NEM customers (up to July 2017 or until 5% cap is reached, whichever comes first) remain in place for a significant period of time (~20 years), or are replaced by storage coupled with intelligent micro grid services that supplant NEM.

[11] Expanded versions of some of these programs available upon request

[12] http://www.cpuc.ca.gov/PUC/energy/DistGen/netmetering.htm

NEM allows for customers with certain qualified solar or wind distributed generation to be billed on the basis of their net energy consumption. Current incumbent utility rate structures incentivize residents and businesses considering new PV or renewable systems to limit the size of those systems so that annual kWh production value does not exceed annual cost of on-site demand.

In January 2014 SCPA authorized that net energy production during each time-of-use period will be valued in consideration of the eligible SCP customer/generator's applicable rate schedule plus a NEM production premium of one-cent per kWh. This will incentivize residents and businesses to increase surplus energy production from photovoltaic and other renewable energy systems with minimal impact on the environment or existing infrastructure.

Current NEM surplus rates are set at the overall average wholesale rate (day ahead market) without taking into account that the power produced is during the more expensive daytime hours. SCP could consider setting the rate at the avoided cost of the energy that would have actually had to have been purchased absent the excess production from the PV system, actually taking into account the estimated time when the system produced the power.

3.3 Retail Solar Cooperative or Shared Energy Cooperative

As outlined in the SCP Implementation Plan, SCP may offer a Retail Solar Cooperative program. Such programs typically feature one or more PV arrays of up to one megawatt each with electric output from these facilities serving as the basis for various retail pricing options. Customers, who perhaps cannot install solar at their own residence, can obtain a share of a larger system shared by others, installed somewhere near where they live.

Some of the issues addressed by retail solar cooperatives include non-optimal siting characteristics such as shade, lack of available roof space, and orientation of dwelling of the customer. Other factors include ownership status, multi-family living arrangements, planned relocation or aversion to up-front capital costs. The availability of shared energy cooperative programs addresses and/or alleviates these issues by creating participatory options that would not otherwise be available to customers.

The retail solar cooperative concept may provide an opportunity for SCP to promote additional, locally developed photovoltaic solar projects that would be voluntarily supported by interested customers, employing the local workforce in the construction of new renewable energy generation facilities in Sonoma County.

SCP may also expand the concept to include other aspects of energy service including efficiency, demand response, automation, storage, etc. in what might be called a "Shared Energy Cooperative." In addition, projects developed via the retail solar cooperative may be preconceived as intelligent micro grids in order to capture the additional value that intelligence, storage and other value-add modernization features bring.

3.4 State Energy Efficiency Fund Programs

Ratepayers in Sonoma County pay approximately $12 million into the public fund that pays for a wide variety of energy efficiency (EE) programs. SCP has statutory authority to elect to administer EE programs for its customers, and to apply to administer programs for everyone in its service territory.

EE programs should be allowed to compete toe to toe with power supply contracts. If an EE program can deliver measured and verified negawatts, or be combined in a program with generation, at lower cost, then the EE-funded program should win over megawatts delivered via a power supply contract. Each prospective measure should be evaluated for cost effectiveness in terms of Total Resource Cost and kWh per dollar of EE money spent.

Demand reduction via efficiency is the most cost effective way to address energy services. An early effort to secure energy efficiency funds available to CCAs should be pursued. EE that benefits Resource Adequacy should be readied by the end of the first year of operations. Other low hanging fruit and/or low cost programs should be given higher priority. CCAs can offer a cost-effective smart sequencing of the rollout of programs.

By that measure, the best SCP use of EE funds is deployment of technology producing immediate cost savings combined with cleaner generation.

- Intelligence: Real time intelligence sufficient to deliver immediate kWh savings exceeding cost of implementation, and then form the foundation for subsequent, cost-effective efficiency, renewables, storage and grid resiliency improvements should be the first priority for use of EE funds.
- Clean Energy Improvements: Following widespread deployment of intelligence, SCP can set incentives for targeting clean energy improvements that produce the fastest conversion off of fossil fuels at the lowest cost. The intelligence platform can both inform and execute on the incentives.

Intelligence meeting the above criteria is presently available to SCP and should be measured against alternative allocation of EE funds.

3.5 Utility Scale Power Purchase Agreements

Power contracts that are executed not using a set feed-in tariff.

3.6 Feed-in Tariff

As stated in the Implementation Plan, SCP may establish a feed-in tariff[13], a policy mechanism designed to accelerate investment in local renewable energy development. It achieves this by offering long-term contracts, typically about 20 years, at a guaranteed price to renewable energy producers based on today's cost of generation from current technology. A FiT program in a competitive market is not an optimal situation, since it forces Sonoma Clean Power to pay a premium for power that it then sells to its other customers who have to also pay the transmission and distribution costs for that power, all while SCP is trying to compete with the incumbent utility that has access to lower cost power. Sonoma Clean Power has to reflect in its rates the cost of all the power it purchases. In this case, it is power purchased, by definition, at a premium, and the longer the term the greater the risk to SCP. Since future local clean power will be cheaper than today's FiT local clean power, the FiT program must be carefully sized and timed in order to avoid becoming a driver of customer exodus.

Prospective Programs

3.7 Behind-the-Meter Energy Installations

This model showcases a win/win/win where SCP, local workers, and customers all benefit in a structure that is sustainable for SCP, enables a massive scale-up of solar installations and energy efficiency, and lowers energy costs for residents and businesses.

A key advantage of behind-the-meter installations is the cost savings from eliminating the customer's transmission, distribution and high-tier/demand charges that combined can be responsible for over half of the electricity bill.

For example, for a customer who usually pays $.30/kWh for their overall electricity service and has a suitable site for solar PV on their rooftop, SCP could offer a contract for the optimally sized solar system to be installed and the electricity it generates to be sold to that host customer for under $.30/kWh for a 20 year term. Since the customer will be consuming the electricity generated by the PV system installed on their property

[13] http://www.cpuc.ca.gov/PUC/energy/Renewables/hot/

"behind-the-meter" there are no transmission and distribution charges and significant tiered rate or demand charges are avoided.

Generally, capturing most of the value relies on Net Energy Metering[14] for the surplus energy the system puts on the grid during the day to net out the equivalent value of electricity consumed at night or other times when the PV system is not generating sufficient electricity to meet the onsite demand. Since the CPUC is determining new regulations for NEM, SCP will need to take full advantage of a behind-the-meter installation strategy during the timeframe when NEM terms are most favorable, likely between the second half of 2014 and July 2017.

Many of the various funding mechanisms discussed in this document could be applied to fund the BTM installations. The key is the contract binding the resident of the building to purchase the power at a set rate and securing agreement for the system to remain for a sufficient length of time to pay off the installation and to reduce any financial risks. SCP continues as the entity serving that customer's full load and retains that customer through the contract's many years as a revenue source for SCP.

Ownership, liability, technical and legal issues need to be resolved to enable SCP to offer contracts similar to a lease or solar PPA to customers that also makes use of the federal tax credit, and accelerated depreciation. SCP's access to load data will help to identify optimal sites.

As we transition Sonoma County fully over to renewable power there's no need for the power generation assets to be owned by out-of-county investors/banks. All aspects of the program can retain the maximum benefits possible for SCP and its customers by redirecting energy dollars from going out of the county to stay in the local economy instead.

3.8 AB 811[15] Property Assessed Clean Energy Program

Property Assessed Clean Energy (PACE) is a way to finance energy efficiency and renewable energy upgrades to buildings via property tax bills. Property owners evaluate measures that achieve energy savings and receive 100% financing, repaid as a property tax assessment for up to 20 years.

The assessment mechanism has been used nationwide for decades to access low-cost long-term capital to finance improvements to private property that meet a public

[14] This may change due to the 2013 enactment of AB 327

[15] http://www.energy.ca.gov/recovery/documents/ab_811_bill_20080721_chaptered.pdf

purpose. By eliminating upfront costs, providing low-cost long-term financing, and making it easy for building owners to transfer repayment obligations to a new owner upon sale, PACE helps overcome financing challenges that have hindered adoption of energy efficiency and renewable energy.

In Sonoma County, PACE financing has been offered by the Energy Independence Program[16] (SCEIP) since March 2009. SCEIP provides money to finance energy efficiency, water conservation, and renewable generation improvements to existing homes and business properties. SCP can partner with SCEIP to identify optimal prospective sites, market the program, and coordinate deployments. Integrating the SCEIP PACE program with SCP program goals can achieve significant synergistic benefits by offering a financing mechanism in cases where conventional lending is not an option, or capital competition is a hurdle.

3.9 SB 555[17] Community Facilities District Program

The Mello-Roos Community Facilities Act allows counties, cities, special districts, and school districts to levy special taxes to finance a wide variety of public works, including parks, recreation centers, schools, libraries, etc. Senate Bill 555 adds the acquisition, installation, and improvement of energy efficiency and renewable energy improvements to the types of facilities that a CFD may finance, or refinance, regardless of whether the buildings or property are privately or publicly owned. An SB 555 Community Facilities District has not yet been established in Sonoma County.

The availability of both AB 811 and SB 555 financing will afford SCP's customers the ability to finance the local assets needed to supply a substantial percentage of the energy and capacity requirements of the county from clean local sources and savings. A particularly valuable characteristic of AB 811 and SB 555 financing of clean energy assets is that SCP is neither the borrower nor the owner of the assets and, therefore, avoids the risk associated with committing ratepayer funds over long periods of time during which the cost of new clean energy is continually falling.
Real estate based/ market based approaches such as AB 811 PACE[18] and SB 555 Community Facilities Districts[19] allow for market forces to keep a CCA competitive.

Although AB 811 financing is already available through the Sonoma County Energy Independence Program, its financing capacity is presently limited. The County needs to

[16] Sonoma County PACE: http://residential.sonomacountyenergy.org/lower.php?url=pace-financing-1614
[17] http://leginfo.ca.gov/pub/11-12/bill/sen/sb_0551-0600/sb_555_bill_20111006_chaptered.pdf
[18] http://www.energy.ca.gov/recovery/documents/ab_811_bill_20080721_chaptered.pdf
[19] http://www.leginfo.ca.gov/pub/11-12/bill/sen/sb_0551-0600/sb_555_bill_20111006_chaptered.html

create an SB 555 district to bring in additional capacity. Funding, organization and set-up of an SB 555 district is commercially available without cost or financial risk to the County. While an SB 555 District would not be formally a part of SCP, its existence and operational strengths can provide substantive support to SCP, and greater assurance of steadily growing local energy resources and jobs. The County should act promptly in order to have this major component of the local energy equation in place by mid-2014.

3.10 On-Bill Repayment Program

On-bill repayment (OBR) is a financing structure that enables home and building owners to finance energy efficiency and renewable energy generation projects through low cost loans from third party investors. The loans are repaid through customers' utility bills and financed at a net savings to the bill-payer. OBR allows for longer-term loans with lower interest rates.

A significant improvement that would require state legislation would be to mandate that the CPUC allow OBR to be automatically tied to the meter and for all customer classes to be able to take advantage of this mechanism. The program and financing would then have to be designed, either statewide and/or with allowances for CCAs that wanted to implement the vehicle more rapidly, likely with a different program structure and source of funds.

In Sonoma County, the "Pay-As-You-Save"[20] (PAYS) OBR program is demonstrating success. After installation of eligible upgrade measures, participants pay a surcharge on their water bill with the assurance that their estimated savings on combined utility bills will exceed the bi-monthly water surcharge. If the bill-payer moves, the payment obligation ends and the next bill-payer at the location gets the remaining savings and makes the remaining payments. If an installed measure fails at any time during the payment period and is not repaired, the payment obligation ends. Once the repayment term is complete, the bill-payer receives the benefit from 100% of the utility bill savings.

3.11 SCP New Local Renewables Investment Program

The concept here is to establish a crowd funding program where investors who do not demand a high return on their investment are offered an opportunity to invest in local resource development, decoupled from their usage and from any specific energy project. The program may include the establishment of or alliance with an existing crowd-source funding enterprise or clean energy bank. A benefit of the program will be that ownership of the assets which harvest clean energy having no fuel cost can stay local.

[20] http://www.ci.windsor.ca.us/index.aspx?NID=819

3.12 SCP Member Cities/County Engagement

The concept for this program is that each participating jurisdiction has many publicly owned facilities that may serve as excellent host sites for Distributed Energy Resource deployment. SCP should engage with each member city and the county to a) identify potential sites, b) characterize potential community benefits that might be realized with the project, c) determine the resource types that might be deployed, d) identify ideal financing options, and d) coordinate incentives for the system.

3.13 SCP-EV Integration and Incentives Program

The next pathfinding endeavor for Sonoma County is integrating two emerging transformative realities: the availability of practical electric vehicles and the establishment of Sonoma Clean Power. Integrating these two realities is a promising means of rapidly reducing the 2.5 million metric tons per year of GHG emissions attributable to the transportation sector in Sonoma County, roughly 60% of total emissions.[21] Integration also creates greater value for SCP's customers and for owners of electric vehicles.

As of 2011, the latest year for which data could be found, Sonoma County uses roughly 178,000,000 gallons of gasoline per year.[22] Estimated diesel sales are about 19 million gallons. Using a conservative figure of $3.00 per gallon of gas, taking into account that some of the price stays in the state and county in the form of the gas tax, that means that more than $500 million leaves Sonoma County's economy each year to fossil fuel payments. The mission at hand is to redirect an ever-increasing portion of that money back into the Sonoma County economy by plugging EVs into SCP as both customers and suppliers – powering their vehicles, and energizing the Sonoma County economy.

Sonoma Clean Power will launch with at least 33% RPS-compliant Renewable Energy in its portfolio and is expected to increase its ratio of local clean power from that point onward. SCP can make EVs and EV charging infrastructure an ever-increasing part of its program:

- Deploying and/or Incentivizing PV Shade structures/EV Charging stations
- Offering incentives for fleet conversions and charging stations
- Monetizing the grid balancing and ancillary services value of EV storage capacity
- Monetizing the generation and load shaping value that storage adds to solar PV

[21] http://www.sctainfo.org/data.htm

[22] http://energyalmanac.ca.gov/gasoline/retail_fuel_outlet_survey/retail_gasoline_sales_by_county.html

Electric Vehicle sales and infrastructure are gaining traction. Sonoma County has been named "most EV-Ready County" by the Bay Area Climate Collaborative; and the Nissan Leaf dealer in Petaluma is number 1 in the nation for all-electric Leaf sales.[23]

Electricity sold at EV charging stations commands higher rates, making projects like PV parking shade structures with integrated charging stations economically more attractive.

Perhaps most important, the integration of EVs into SCP offers Sonoma County a truly powerful way to cost-effectively meet the requirements of AB32. Since transportation accounts for roughly 60% of GHG emissions, it is impossible to reduce emissions enough to satisfy AB32 without addressing the transportation sector. Financial penalties, in one form or another, accrue to failure.

The simplest metric for GHG emissions in transportation is tons of carbon emitted per vehicle mile traveled (VMT). From an AB32 perspective then, the most valuable form of transportation is that with zero carbon per VMT. A solar-charged electric car carrying multiple passengers is the ideal transportation in Sonoma County. By coupling EVs to SCP through intelligent micro grids, the ideal form of transportation in terms of GHGs can also be the least expensive and most convenient form of transportation.

In California, those who derive energy from burning fossil fuels have begun to pay a penalty for the carbon emissions, presently trading at $12 to $13 per ton. With communicating intelligence incorporated into EV charging (whether at dedicated charging stations or in homes, offices, or retail centers), the carbon reduction per VMT can be quantified and verified. The tonnage of avoided carbon can then be reported to SCTA, monetized by SCP, and paid to the SCP customers who created the value.

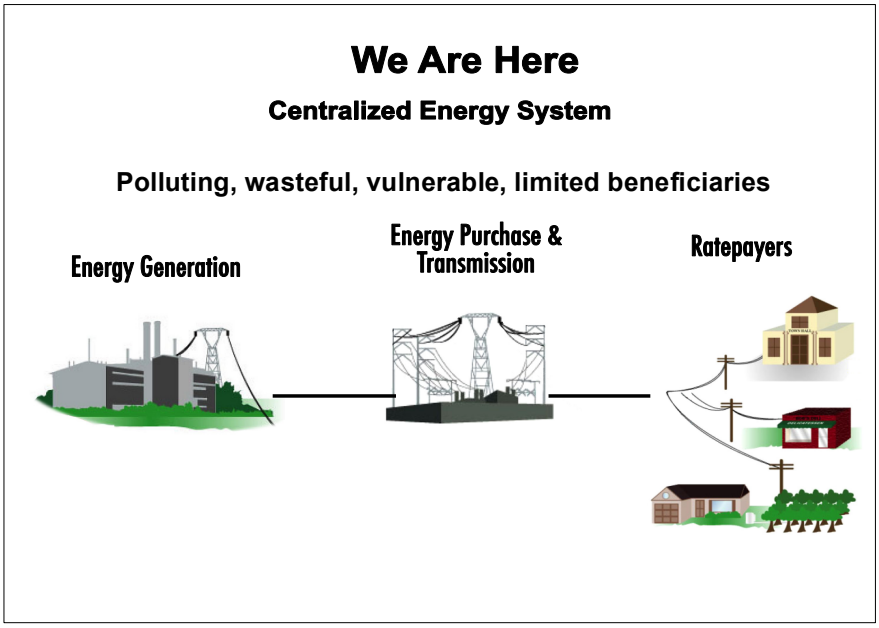
The same communicating intelligence that quantifies and verifies the GHG reduction can also enable reliance on the storage capacity of the batteries in the EVs. As that capacity and reliability are validated through CAISO, balancing and ancillary services value can be monetized by SCP and paid to those who created the value.

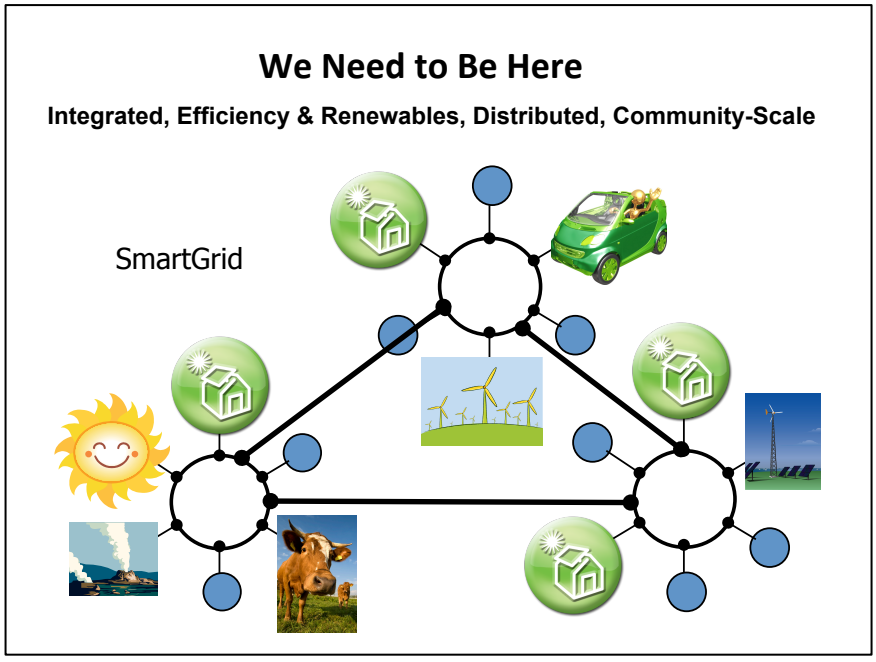
The net result is creation of two revenue streams which serve to simultaneously lower the cost of EVs and lower SCP's cost of energy. One derives its value from reducing GHGs per VMT. The other's value comes from reducing waste on the grid.

3.14 Intelligence/Grid Modernization/Microgrid Pilot Program [24]

[23] http://www.pressdemocrat.com/article/20130709/business/130709555#

A global transformation is underway where the one hundred year old central station model of electricity generation and delivery is being replaced by a distributed model.





[24] Special Thanks to Dave Erickson for his contribution to this Plan element

Because the existing grid has no way of knowing exactly when any of us who are connected to it will place demands for electricity on the system, and because it has no way to control when or what quantity of demands for electricity are turned on, the electric utilities must acquire and pay for enough electricity generation to meet all the possible demand for power also arriving at the same time. Because everybody's maximum potential demand going on at exactly the same time is quite rare, a lot of generating capacity sits idle most of the time. The "load factor" for California's grid is 55%, which is a gross measure of how much of our total capacity is used, on average. Another way of looking at it is: Since the existing grid is both blind and dumb, it wastes about 45% of the energy capacity it buys.[25] [26]

By adding communications and information technology to buildings in SCP's service area, the waste and inefficiency inherent in the seriously outdated electric grid can be reduced, potentially resulting in declining energy bills and cleaner power.[27] This can be done with existing technology, commercially available without cost to SCP, based on immediate net savings to customers hosting the communicating intelligence. The key components are:

1. Real time monitoring, assessment and remote management of energy usage within residential and commercial buildings, behind the meter. This can be done with a cloud-based intelligence platform[28] that shapes the load of SCP's customers, reducing the quantity of power required to satisfy the total energy demand.

2. Automated Demand Response gives SCP the ability to dynamically shed or feed load in real time within its service area in response to grid conditions and/or energy cost parameters. The result is creation of capacity at costs well below the next least cost alternative.

3. A form of on-site automated generation control gives SCP the ability to dynamically direct locally produced clean power to its most valuable use. For example, solar PV may, at times, be best used feeding the demand coming from the building to which the PV panels are attached; at other times it may best be used to charge batteries; at other times it may best be fed into the grid in response to remote

[25] For a snapshot of the amount being used vs. the amount available, see CAISO website for "Today's Outlook" at: http://www.caiso.com/Pages/TodaysOutlook.aspx

[26] See this excellent short explanatory video: http://www.youtube.com/watch?v=OgWjwLheNoA

[27] See resources in 2013 book "Innovations Across the Grid" http://www.edisonfoundation.net/iei/Pages/IEIHome.aspx

[28] Though cloud-based, this approach uses on-site equipment communicating to the cloud in real time delivering both on-site monitoring and control and grid optimization

demand.

In the wake of super storm Sandy a local utility credited a partially operational smart grid system with getting power restored more rapidly than surrounding areas.[29] System resilience is one reason to adopt grid modernization technologies, but cost savings, load shaping, GHG reductions, and demand reduction are also good reasons.

Optimizing the operation of a real-time intelligent grid and islandability of the County by 2030 is currently the domain of the distribution utility for the most part.

Sonoma Clean Power is already in a position to facilitate the construction of microgrids today and does not have to initiate and wait for legislation or the conclusion of a lengthy and controversial CPUC proceeding to do so.

SCP should include a microgrid as an integral part of its Strategic Plan. There are several viable approaches that can be pursued by SCP.

The following is a step-by-step template for how an intelligent microgrid might take shape as part of, or independent of, any of the above rollout scenarios.

1. **Identify Optimal Generation Sources:** SCP should think strategically about local energy resources that may form the backbone or anchor of a future microgrid, and are useful and cost effective to deploy today. These are the resources that can be prioritized for deployment, unconnected from a microgrid at first, but designed with eventual integration at a later time. Combined heat and power (CHP) systems work well as anchor resources given their 24/7 availability where storage or some other form of power firming due to the intermittency of renewables is unnecessary. Solar PV systems may also serve as an anchor when integrated with storage.
2. **Identify Deployment Sites:** Use the Sonoma Renewable Energy Secure Communities (RESCO) database to identify prospective microgrid sites that contain at least one good potential commercial solar/storage and/or CHP customer. In these optimal microgrid sites, the RESCO tool can be used to identify the distribution feeders, and get enough rooftop solar PV on those feeders, in addition to the anchor projects, to stay within the limit of that distribution circuit.
3. **Establish Partnerships with Developers:** Establish partnerships with vetted solar and CHP developers and work with large commercial customers to develop solar and CHP installations at optimal sites. Design a microgrid pilot project at a location especially chosen for its particular requirements such as a college campus, hospital,

[29] http://www.governing.com/blogs/bfc/col-smart-grid-meters-electricity-outage-hurricane-sandy.html

government building complex, etc. There are California state incentives that can help with the CHP deployment, and SCP can use its load data to identify the best CHP customers.

4. **Legislative/Regulatory Considerations:** An updated rate structure to support the transmission and distribution (T&D) benefits of a microgrid, as well as regulatory incentives for microgrids, also needs to be established. One possible way to approach this is to press the CPUC to identify microgrids as a key element of grid modernization.

These are all things that should be done anyway, and if properly planned, would provide all the elements of a microgrid. Once the distributed generation facilities and regulatory changes are in place, a controller, storage and islanding capability can be added to the microgrid.

Several examples of well-established microgrids exist in the state, such as the ones at UC San Diego[30] and the Santa Rita Jail[31] in Alameda County. SCP can take the lead in coordinating the first microgrid project in Sonoma County to help pave the way for the multiple benefits that microgrid technology brings.

Home Area Networks

A home area network (HAN) is an integration via computer of appliances, electronics, and other electricity-using elements of a residential home or small business in order to maximize control, efficiency and interoperability of the system. SCP should be a party, as the Marin Energy Authority is, to the demand response (DR) rulemaking that is underway at the CPUC. SCP should advocate for access to the smart meter HAN, as MEA will, to enable SCP to rapidly develop a ubiquitous, low cost DR program based on the HAN.

3.15 Local Renewable Energy Certificate Purchase Program

The concept here is to develop a program where the value of renewable energy certificates can be realized by aggregating the many small PV installations in SCP's service territory. The renewable energy certificates from the existing ~50 MW of solar PV installed in the SCP service territory might be sold to SCP. Adding communicating intelligence to existing PV cost-effectively provides the information needed to validate the RECs. This creates a win/win where SCP can benefit by incorporating these RECs into its portfolio for compliance purposes and the PV owners can benefit as sellers of

[30] http://ssi.ucsd.edu/index.php?option=com_content&view=article&id=416:smart-power-generation-at-ucsd-november-1-2010&catid=8:newsflash&Itemid=20

[31] http://www.acgov.org/smartgrid.htm

the RECs.

3.16 Sonoma County Efficiency Financing Program

The Sonoma County Water Agency has established a sustainable energy utility program called Sonoma County Efficiency Financing.[32] It is based on a program first launched in the state of Delaware known as Energize Delaware.[33] The program is designed to foster a sustainable energy system through conservation, efficiency and the deployment of renewables. In this program, non-residential customers are aggregated in order to create a virtual single efficiency retrofit project that is sizable enough to go to the bond market and finance the multiple projects with one bond issuance on the scale of perhaps $20 million. SCP can serve as a coordinator of such a program.

3.17 Revenue Bonds

Revenue bonds finance income-producing projects and are secured by a specified revenue source, in the case of Sonoma Clean Power, the revenues from the sale of electricity. Although SCP has access to low cost financing via this mechanism, the long-term decline of the cost of renewables makes revenue bonding a problematic prospect for SCP.

4. Clean Power Leaders

Sonoma Clean Power can establish a suite of offerings from the programs listed above that allow customers to voluntarily do more to help reduce greenhouse gas emissions and not necessarily pay more as in the EverGreen program. Those people who choose to do more, "Clean Power Leaders," can blaze the trail for other SCP customers to follow.

Option 1. Smart Home/Business. In this option, customers would agree to smarten their homes or businesses, and would be assured of a lower monthly bill, courtesy of reduced waste and monetized negawatts. The critical foundation for transitioning off of fossil power onto cleaner, cheaper local power is an intelligent grid which lowers all customers' rates by shaping the load and avoiding the need to buy expensive fossil peak power. This can actually be done at a cost below SCP's normal rates. In the process, these customers will be creating power capacity at costs far below what SCP would otherwise be paying for peak power. The savings can be passed on to SCP's regular customers.

[32] http://www.scwa.ca.gov/scef/
[33] www.energizedelware.org

Option 2. Battery Storage. Properties with existing solar PV systems would add battery storage and tie into the intelligent grid created under Option 1. This would allow these Clean Power Leader customers to bring Automated Generation Control and Ancillary Services into SCP's portfolio. These capabilities are highly valuable to the grid and can be monetized for the benefit of SCP as a whole. The Clean Power Leaders' contribution in this part program will be to demonstrate and quantify the benefits achievable through combining storage and communicating intelligence with the ~50 MW of existing solar assets in Sonoma County.

Option 3. Energy Retrofits. These are customers willing to do efficiency retrofits of their homes or businesses, using SCEIP, SB 555, or OBR financing, and validating the improvements through the intelligent grid so the aggregated demand reduction can be used to meet SCP's Resource Adequacy requirements. Under this Option, the customer would see a net reduction in monthly bills while simultaneously creating a cost savings for SCP.

Option 4. Shared Energy Cooperative. This product centers on construction of new renewable energy generation, storage, efficiency and smartened facilities in Sonoma County employing the local workforce. As outlined in the SCP Implementation Plan, SCP may offer a Retail Solar Cooperative program to further promote local renewable energy projects. Like the retail solar cooperative and other virtual net metering concepts, a Shared Energy Cooperative can provide an opportunity for SCP to promote additional, locally developed clean energy projects that would be voluntarily supported by interested customers.

5. Financial Considerations and Cost Analysis

Financial Considerations

SCP program elements must be cost-effective to ensure SCP financial success and survival and result in either a decrease in load or an increase in renewably generated electrical power in order to reduce GHGs. A general approach to financing is to identify technologies, programs, and finance structures that put time on the side of the project and program developer. Meaning, choose technologies that are not subject to volatile fuel costs, and choose financing tools that decrease rates or bills over time.

A key consideration in choosing among finance structures to be used is whether the borrower is SCP or not. Traditionally in the utility business it was considered safe to pledge the future revenue stream of ratepayers as security for repayment of large

obligations undertaken to provide energy to those ratepayers over long periods of time. However, that approach is no longer safe, as demonstrated by the recent experience of the major utility companies in Europe, and in the Edison Electric Institute study, "Disruptive Challenges: Financial Implications and Strategic Responses to a Changing Retail Electric Business." The Edison study discussed a "death spiral," and the European utilities have been experiencing it, losing over $500 billion dollars of valuation in the past few years.[34]

The strategic driver is the same in both cases, and is the same challenge that SCP must face. The cost of clean, renewable energy has been declining rapidly, and will continue to do so for the foreseeable future. The cost decline is bringing the assets required to harvest clean energy into the price range of more and more utility customers. Solar companies are already beginning to offer combinations of PV + battery storage in power purchase agreements which ensure prices significantly below grid power. Customers' need for energy will not disappear, but their need for SCP will depend heavily upon whether SCP's business model is dramatically different than the Investor Owned Utilities' present model.

As increasing numbers of customers opt to provide their own power, the conventional utility's high fixed costs must be allocated across a smaller customer base, which serves to accelerate the exodus of customers. Were Sonoma Clean Power to undertake significant debt or large contracts for energy acquisition by pledging its customers' cash flow over long periods of time, it may place itself in the same death spiral risk position as the IOUs.

If, as a result of using financing structures which commit SCP customers' monthly payments to either purchase of large assets or service of long term debt, SCP limits its ability to replace remote power with cheaper local power, it may find its customers leaving SCP for the same reason many of the customers in the county are now leaving PG&E: newer cleaner power is a better deal than old fossil power.

It is important to note that the argument above applies to central station power plants but not to Behind The Meter assets, as the latter, if financed through SCP, would utilize payment mechanisms that contractually obligate the customer to fully pay off the asset.

In the above light, how the financing of energy supplied to SCP is done becomes strategically critical. In summary, risk to SCP is mitigated when individual energy

[34] The Economist, October 12, 2013

suppliers are the borrowers and/or owners of clean energy assets. This is not to say that SCP should *never* consider owning its own assets, the caveat is that it should do so carefully.

Off-balance sheet financing
The next key consideration is that "off-balance-sheet financing" must be available in order to allow and motivate SCP commercial customers to create local clean energy assets capable of supplying renewables, storage and efficiency to SCP at steadily falling costs. In order for commercial property owners to participate at scale, the financing structures must avoid the "capital competition" problem. To solve that problem, the financing must be off balance sheet. AB 811, SB 555, and On Bill Repayment meet this requirement.

Return on Investment
The first question asked when a facilities manager suggests renewables, storage, or energy efficiency improvements to the Chief Financial Officer is: "What's the Return on Investment?" This question arises from the assumption that either company capital or company debt capacity will be used to pay for the project. Frequently, the ROI on clean energy retrofits cannot compete with the profitability of company operations, so the improvements are not done. AB811, SB555 and OBR offer the solution. These programs finance 100% of the engineering and improvement cost of qualifying projects with off-balance-sheet debt, through a funding mechanism that can't be used for any other purpose. No company capital or debt capacity is required. Consequently, the ROI comparison to company operations does not apply. The increased tax assessments do not change the company's debt capacity, since energy cost reductions fully offset the tax payments. The OBR mechanism shows the company's cash flow improvement directly from the net decrease on its utility bill. Conventional debt service capacity is increased by the net positive cash flow that results from the improvements financed under any of the three structures.

The bottom line is that business managers are not forced to choose between investing to grow their business *or* reducing expenses and improving the environment. They can do both.

Cost Analysis

Cost analysis remains to be performed for each resource, each program, as well as analyses of multiple combinations of resources and programs in order to identify combinations that optimize the system. Programs or services may be bundled in order to be more cost effective, and/or to benefit from synergy of the bundling. Energy project

developers and property owners will also be analyzing individual projects for viability.

The broader analyses should outline what it will cost for each of those energy resources to be developed to the 2030 goal. Resources and programs should be analyzed with an eye toward the degree to which they beat the incumbent utility and customer-owned distributed energy resources on a cost basis.

The Sonoma Renewable Energy Secure Communities (RESCO) report contains resource cost analyses. The following is from the RESCO Report:

> *Cost-Effectiveness of New Resources*
>
> *Sometimes higher cost resources are dismissed as too expensive, even though they may provide important benefits for an energy supply mix. For example, solar energy may be more expensive than other energy sources, but it provides power during the day when demand for electricity peaks and purchasing electricity on the market from conventional sources is also more expensive. One important principle of building an energy supply portfolio is to have diversity of resources to reduce the risks of "putting all eggs in one basket." A diverse energy supply will balance performance as well as price risks, so that when the price of one source of energy goes up, or a particular generator produces less than anticipated, it does not unduly increase customer rates. A well managed portfolio will also balance more expensive resources with less expensive ones, such that the overall cost of the portfolio is made as affordable as possible while also achieving the overall policy goals of the program as nearly as possible.*

Principles such as those found in the RESCO report may be applied as costs are evaluated for resources and programs promulgated by Sonoma Clean Power.

5. Distributed Energy Resources Deployment Contracts

The suggested approach for SCP, is to foster a paradigm shift so that rather than attempting to think through each step of such an innovative enterprise in such a complex field, let alone asking policy-makers to do so, the focus should instead be on creating the right framework and contracting strategy. SCP can outsource risks and rewards to the private sector to attract the expertise needed to achieve goals. That may mean allowing limited access to customer data to private sector experts under strict usage agreements and only compensating companies when they successfully create the revenue streams out of which they are paid.

One of the key tools or advantages that community choice aggregators have at their disposal is access to customer usage data. Such data is a powerful tool that can be utilized to identify specific locations and/or customers whose location and/or usage

pattern may be targeted in order to shape the overall load in such a way that lowers costs for all customers by reducing peak demand.

This document recommends that the optimal DER sites be determined by evaluating prospective sites from both a technical and financial perspective. Current load data, GIS analysis, phone and email interviews, and site visits may be used to augment the effort.

Using the RESCO Report methodology, SCP staff and/or consultants can identify the financial low hanging fruit, and develop a set of financial structures to be employed for deployment. The project team should analyze risks and encompass compliance with all regulations (e.g., resource adequacy, RPS). A set of RFPs can be drafted for local contractors who will actually build infrastructure.

An open question revolves around the ideal long-term ownership model. Some assert that SCP should own the asset, in large part to retain control and to release itself from ongoing obligations to third party generators. Others assert that SCP should not own the assets, that SCP should just serve as the off-taker and avoid long term obligations.

7. Integration

There are at least four categories of integration that must be addressed: 1) Integration of two or more programs with each other, 2) Integration of wholesale remote power purchase plans with growing local supply of distributed energy resources, 3) Integration of various energy resource types, 4) Integration of SCP programs with external factors.

1) Integration of two or more Resource Development Programs with each other:
Initial concepts related to integration and sequencing of program rollout have been outlined in this document. Further work needs to be done to evaluate ways that two or more programs can be integrated. In some cases it is actual programmatic integration, in other cases it may be identifying opportunities to integrate two or more programs in marketing messages and pricing incentives.

2) Integration of wholesale power purchase plans with distributed energy resources:
The main concept is that it is important to ensure that wholesale purchases do not foreclose on or crowd out local resource development. Energy Service Provider market purchases can undermine local resource development. SCP must avoid tying up too much of its revenue in purchasing remote wholesale power, thus maintaining sufficient room for purchase of local power, storage and efficiency.

If SCP plans to develop local energy resources to the extent necessary to achieve its stated goals, then allowing the ESPs to base their bids on PG&E load data with no accounting of anticipated local energy resource development will produce contracts that are not optimally suited to the actual load that will need to be met over time. Only by basing power purchase bids on load data that takes these combined sets of data into account will the contract amounts be accurate and beneficial to SCP customers.

Prioritizing local development is an integral part of SCP reducing risk, improving its financial viability and providing protection from being undercut by the procurement of wholesale market power, or by departing customers supplying their own clean energy. Although an open position and substitution clause that allows for the replacement of contracted power with local projects is helpful, it does not obviate the need for an integrated resource plan. The left hand (power purchase) should anticipate steady growth of, and be coordinated with, the right hand (local resource development).

Knowing the amount of local energy resources to be developed and load reductions to be achieved will enable SCP to:

- Avoid purchasing more out-of-county power than needed
- Receive more accurate bids, since bidders will have better data on the correct amount of electricity demand
- Request the appropriate power or storage, and real time intelligence to balance intermittency and optimize usage
- Incentivize creation of a robust market of local buildings and properties competing to supply clean power to SCP

3) Integration of various energy resource types
Two or more energy resources deployed in a planned, integrated way can increase the value of each separate resource. Baseload combined with deployed or planned renewables is a good example.

4) Integration of SCP programs with external factors
CCA is a program that fits into a very large and complex energy system. SCP will need to integrate with the policies of all of the regulatory agencies, particularly CAISO and the CPUC, and with its host IOU, PG&E.

Several county and city energy-related programs exist. SCP should evaluate how it might coordinate with these programs. The Sonoma County Energy Independence Program is a good example. Opportunities may exist for win/win synergies where mutual benefits can be realized by evaluating how such programs might interact with SCP.

8. Recommended Actions

The following recommended actions are divided into three categories, near, mid, and long term. As stated earlier, there are some programs and policies that should be in place at launch. SCP should not wait for the finalization of its Resource Plan to refine and initiate programs that are best introduced at launch in order to integrate them into the rate structure, or at least some time during Phase 1 so that they become available at a time when many people are paying attention to publicity surrounding overall program launch.

Near Term (prior to and at launch and/or at least in Phase 1)

8.1 Issue a Request for Information from energy services companies or consortia that can assist in all aspects of local energy resource development, specifically distributed energy resources development;

8.2 Begin a process of restructuring the EverGreen program so that the premium funds *new* local renewable energy development;

8.3 Obtain individual 15-minute energy billing/meter data that limited the RESCO site-specific analyses;

8.4 Need to do a very careful analysis of PPA terms - especially for existing solar PV - to see who really benefits. The analysis should show the perspectives of (a) customers, (b) SCP, (c) contractors/OEMs, and (d) Clean Tech funds. This will guide the development of standards for equitable contracts;

8.5 Work with all participating jurisdictions (cities and County) to identify top tier deployment sites on public buildings within each entity's border;

8.6 Work to enact state legislation mandating the CPUC allow OBR to be automatically tied to the meter and for all customer classes to be able to take advantage of this mechanism;

Mid Term (1-4 years)

8.7 Work with the County Board of Supervisors to establish a countywide Community Facilities District pursuant to SB 555

8.8 Utilize customer usage data in order to carry out planned DER deployment

8.9 Create Clean Power Leaders program for customers *willing to participate* in creative ways

8.10 Integrate planned DER development with wholesale electricity purchases

8.11 Apply for grant funding from the Electric Program Investment Charge fund, and other state and federal energy program grant opportunities.

8.12 Intervention is needed at the state legislature, CPUC, and CAISO to open up the grid to distributed energy resource participation.

Long Term

8.13 Integrate SCP net revenues into financing of planned DER deployment

8.14 Work with the Sonoma County Water Agency and other relevant agencies and private sector interests to identify prospective appropriate ocean energy conversion deployment/s

8.15 Work with relevant public agencies and private sector interests to identify prospective appropriate offshore wind energy deployment/s

Five-Tear Program Roll-out Table

The following table offers a look at how the sequencing of program initiation might unfold.

Year/Phase 1 2014	Year/Phase 2 2015	Year/Phase 3 2016	Year 4 - 2017	Year 5 - 2018
At Launch: • ESP Contract • EverGreen • NEM rate • Local PPA Phase 1: • FiT • BTM PPA	• EE Funds • OBR • RSC • SCP Investment • SB 555 /CFD • Integration with AB 811/PACE • EV Integration	• Microgrid Pilot • Revenue Bonds • Local REC Purchase	• Evaluate Coastal/ Offshore Resources	• Continuation of all previous

Appendices

i. Glossary

Term or Acronym	Definition
Anaerobic Digester (digestion)	Process in which microorganisms break down biodegradable material in the absence of oxygen and release chemical energy (potential fuel) in the form of methane gas.
Ancillary Services	Services necessary to support the delivery of electric power from seller to purchaser. Examples include scheduling and dispatch, reactive power and voltage control, loss compensation, load following, and system protection.
Assembly Bill 2514 (AB 2514)	California state legislation (Skinner, 2010) mandating specific levels of energy storage for utilities and CCAs by 2020.
Assembly Bill 32 (AB 32)	Also known as the Global Warming Solutions Act, California state legislation that sets the 2020 greenhouse gas emissions reduction goal into law
Assembly Bill 327 (AB 327)	California state legislation (Perea, 2013) that will restructure electricity rates, including net energy metering, and may impose flat fees on ratepayers.
Assembly Bill 811 (AB 811)	California state legislation (Levine, 2008) that enables property owners to finance energy efficiency and renewable energy systems via a property tax assessment.
Automated Demand Response (ADR)	Automated demand response refers to programs in which end users' electrical systems or appliances respond directly to price, environmental, or emergency signals without the need for human intervention.
Baseload	The minimum amount of stable energy service (natural gas or electricity) needed to supply a given service area over an extended period of time, such as a day, a month, or a year.
Behind-the-meter (BTM)	Energy resources or efficiency measures that are physically located, and financially valued, on the customer, not utility, side of the electric meter.

Biomass	Biological material from plant or animal sources that may be used as a feedstock in anaerobic digestion.
California Independent System Operator (CAISO)	The CAISO oversees the operation of California's bulk electric power system, transmission lines, and electricity market generated and transmitted by its member utilities
California Public Utilities Commission (CPUC)	The CPUC is the regulatory agency that regulates privately owned public utilities in the state of California, including electric power and natural gas utilities.
Capacity	Capacity refers to the maximum output in a given instant of time of any power generating system or collection of systems.
Combined Heat & Power (CHP)	The use of an electrical power generation facility to simultaneously generate electricity and useful heat.
Community Choice Aggregation (CCA)	A local governmental program that buys, and may generate, electrical power for residents and businesses within the jurisdiction of the local government.
Community Climate Action Plan (CCAP)	Sonoma County's first Climate Action Plan, published in 2008.
Community Facilities District (CFD)	A district enabled by statute that allows a special tax to be imposed in order to finance the construction of public improvements including energy related facilities.
Customer	Customer is distinguished from ratepayer. CCA bill-payers are customers, due to the fact that they have a choice about their energy service provider.
Demand Response (DR)	Demand response mechanisms respond to explicit requests, or automated controls, to reduce or shut off energy usage, usually during times of stress on energy supplies.
Deployment	The process of financing, building, and operating new renewable energy, intelligence or energy efficiency.
Direct Access (DA)	A legacy of the deregulation effort in California where larger, non-residential customers continue

	to maintain bilateral contracts with energy service providers and do not pay the generation portion of their bill to the IOU in whose service territory they operate.
Distributed Energy Resources (DER)	Refers to all forms of energy assets, including generation, efficiency, intelligence, storage, etc., that are not centralized generators.
Distribution Circuit	The area served by a given substation in a local distribution grid.
Electricity (or energy) Service Provider (ESP)	This term may refer to a corporation that serves as a generator and/or broker of electrical power. It may also refer more generally to any entity that provides energy related services.
Energy Efficiency (EE)	A technology, measure, or practice that delivers comparable or superior service or performance output, using less energy input.
EV	Electric Vehicle
EverGreen	The premium "opt-up" service offered by SCP.
Feed-in Tariff (FiT)	A policy mechanism whereby an energy utility is required to purchase energy supplies, normally from renewable sources, at a pre-established, administratively set price or schedule of prices.
Generation	Refers to electrical power generation.
Geographic Information System (GIS)	A digital system designed to capture, store, manipulate, analyze, manage, and present all types of geographical data.
Geothermal	Thermal energy generated and stored in the Earth that can be used to generate electricity, or to provide heat for buildings or industrial processes.
Geysers	A complex of geothermal power plants drawing steam from more than 350 wells, located in the Mayacamas Mountains in Sonoma and Lake Counties.
GHG	Greenhouse Gas
Grid Modernization	This term refers to all aspects of the application of electronic communications and controls to electricity generation and delivery. May include or encompass intelligence, smart grid, microgrid, automation, control, distributed energy storage,

	etc.
Home Area Network (HAN)	A type of local area electronic network that is designed to meet the need of facilitating communication and interoperability among digital devices present inside or within the close vicinity of a home.
Hydroelectric	The generation of electrical power using the gravitational force of falling water, and engineered structures, such as dams, that constrain or divert bodies of water.
Implementation Plan (IP)	The formal plan, required by statute, that a CCA must file with the CPUC prior to launch.
Intelligence	Refers to the application of software and digital control to electrical systems, the smart-grid or microgrid aspect of energy services. The key elements are automated demand response, a localized form of automated generation control and demand side management.
Investor Owned Utility (IOU)	A regulated business organization, providing a product or service regarded as a utility (often termed a public utility regardless of ownership), and managed as private enterprise rather than a function of government or a utility cooperative.
Islandable or Islandability	The ability of a local electrical system to sustainably operate, free from dependence on the larger regional or statewide electrical transmission and distribution grid.
Kilowatt-hour (kWh)	A unit of energy equivalent to one thousand watts of power expended for one hour.
Levelized Cost of Energy (LCOE)	All the costs of an energy resource over its financial life divided by the total number of kilowatt-hours or megawatt-hours of electricity generated over the same period; normally adjusted on a net-present value basis.
Load	An amount of electrical power demanded or consumed by an electricity user or customer.
Load Serving Entity (LSE)	Any entity that supplies electrical power to meet the electrical power needs of its ratepayers or customers.

Localization	Refers to the transformation of the system of decision-making about energy and generation of energy from a remotely based paradigm to one where the local community is in control and power generation is increasingly local.
Marin Energy Authority (MEA)	The first community choice aggregation in California.
Megawatt (MW)	A unit of electricity equal to one million watts.
Microgrid	Small-scale electricity network that includes all of the elements of the larger electrical grid. Microgrids are usually designed to achieve specific local goals, such as energy security, diversification of energy sources, GHG emission reduction, reliability, and cost reduction.
Monetization	Refers to the conversion of an energy asset that is not necessarily a revenue-producing asset, into a revenue-producing asset.
Negawatt (NW)	A unit of energy that is not required to be generated, resulting from implementation of efficiency measures.
Net Energy Metering (NEM)	An electric rate structure that allows a customer-generator to receive a financial credit for power generated by their onsite system and fed back to the utility. The credit is used to offset all, or a portion, of the customer's electricity bill.
Off-taker	Refers to the buyer or purchaser of energy.
On-Bill Repayment (OBR)	A DER financing system where qualifying energy-saving projects are identified, customers have them installed at no upfront cost, and pay for them over time on their utility bill.
Opt-up	Refers to the ability of a customer in a CCA program to voluntarily pay a premium in order to receive a superior quality energy product.
Optimization	Means taking an energy resource or combination of resources and financing mechanisms and formulating a program that realizes the most cost-efficient and maximized deployment of the resource.
Pacific Gas & Electric (PG&E)	The investor owned utility in whose service

	territory Sonoma Clean Power is located.
Pay-As-You-Save (PAYS)	An on-bill repayment program in Windsor, currently limited to water-saving measures.
Peak (or peak demand or peak load)	The highest amount of electricity demand in an electricity load profile.
Photovoltaics (PV)	A method of generating electrical power by converting solar radiation directly into electricity using semiconductors that exhibit the photovoltaic effect.
Power Purchase Agreement (PPA)	A contract between two parties, one who generates electricity for the purpose of sale (the seller) and one who is looking to purchase electricity (the buyer), who does not own the electrical generation equipment.
Property Assessed Clean Energy (PACE)	Loans for energy efficiency measures or renewable energy that are repaid over a fixed term via a voluntary assessment on property tax bills.
Ratepayer	One who pays for utility services such as electricity or natural gas, in a regulated monopoly utility model, based on an established schedule of service rates. The term "customer" is not used due to the fact that no choice of service provider is involved on the part of the bill payer.
Renewable Energy Certificate (or credit) (REC)	A REC represents the property rights to the environmental, social, and other non-power qualities of renewable electricity generation. A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source
Renewable Energy Secure Communities (RESCO)	A 2009-2012 California Energy Commission-funded program that in Sonoma County examined local energy resources and developed portfolios of localized energy resources.
Renewable Portfolio Standard (RPS)	California law that requires investor-owned utilities, electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33% of total procurement by 2020.

Resource	Refers to all energy related energy assets including but not limited to efficiency, storage, and renewable energy generation.
Resource Adequacy	A CPUC regulatory program that requires load-serving entities, including CCAs, to demonstrate that they have purchased capacity of no less than 115% of their peak loads. These purchase requirements are intended to secure sufficient commitments from actual physical resources to ensure system reliability.
Retail Solar Cooperative (RSC)	A program proposed in the SCP Implementation Plan that aims to allow customers who cannot install PV at their locations to share in the development of an installation elsewhere in their community.
Return on Investment (ROI)	A performance measure used to evaluate the efficiency of an investment or to compare the efficiency of a number of different investments. To calculate ROI, the benefit (return) of an investment is divided by the cost of the investment; the result is expressed as a percentage or a ratio.
Revenue Bonds	A revenue bond is a special type of municipal bond distinguished by its guarantee of repayment solely from revenues generated by a specified revenue-generating entity associated with the purpose of the bonds, rather than from a tax.
SCP	Sonoma Clean Power, the second CCA to launch in California.
Senate Bill 43 (SB 43)	California state legislation (Wolk, 2013) that mandates that utilities develop 600 megawatts of electrical power by 2020 from shared solar projects.
Senate Bill 555 (SB 555)	California state legislation (Hancock, 2011) that enables Mello-Roos community facilities districts to finance renewable energy and energy efficiency improvements on private property.
Shared Energy Cooperative	An expanded version of a Retail Solar Cooperative, where other energy assets, in

	addition to solar, may be shared.
Smart Home/Business	A home or business that incorporates intelligent systems into its energy management.
Solar Investment Tax Credit (SITC)	A 30 percent tax credit for solar systems on residential (under Section 25D) and commercial (under Section 48) properties.
Solar Lease	A form of financing for solar where the customer does not own the system and pays a third party a fixed lease rate.
Sonoma County Efficiency Financing (SCEF)	A program initiated by the Sonoma County Water Agency to finance energy efficiency and water conservation retrofits for public and non-profit facilities.
Sonoma County Energy Independence Program (SCEIP)	A County of Sonoma Energy and Sustainability Division program that serves County residents and businesses as a central clearinghouse of information about energy efficiency, water conservation and renewable energy generation.
Storage	Refers to a device or system that stores electrical or other forms of energy for use at a later time.
Sustainable Energy Utility (SEU)	A non-profit model originating in the state of Delaware that offers a one-stop resource to help residents and businesses save money through clean energy and efficiency. It is not actually a utility.
Total Resource Cost (TRC)	The total resource cost test measures the net costs of a demand-side management program as a resource option based on the total costs of the program, including both the participants' and the utility's costs.
Transmission and Distribution (T&D)	Transmission refers to the long-distance high voltage conveyance of electricity, distribution refers to the lower voltage community-level conveyance to end-users.
Value Chain Analysis	A method of identifying and quantifying benefits in every part of a company’s or public agency’s products and services.
Virtual Net Metering (VNM)	A tariff arrangement that enables a multi-meter energy system owner to allocate a solar system's

	energy credits to other energy users.
VMT	Vehicle Miles Traveled
Wholesale Electricity Purchase	The bulk purchase of electricity for the purpose of delivery to end-users.

ii. Legislative/Regulatory Context

SCP does not operate in a vacuum. Existing regulation and regulatory proceedings at the CPUC affect SCP and its ability to implement efficiency programs and accelerate renewable energy deployment.
Many of the regulations mandate the development of specific energy resources, such as storage.

Energy Storage:[35] Pursuant to AB2514, all CA LSEs are required to develop energy storage. CCAs are required to develop storage equivalent to 1% of their peak demand by 2020.

Solar Investment Tax Credit: The SITC is a 30 percent tax credit for solar systems on residential and commercial properties. It reduces to 10% on December 31, 2016 unless it is extended by an act of congress. Without the 30% SITC, many projects will not pencil out. So, unless the SITC is extended, or, solar project costs fall even more rapidly than they have to date, there is a limited time window to get these projects in the pipeline.

AB 327: In 2013 Assembly Bill 327 was signed by Governor Brown. AB 327 affects CCAs in that it mandates the restructuring of the net energy metering law for all load-serving entities in the State. In particular, projections for a behind-the-meter NEM program are in question given the current regulatory uncertainty.

SB 43: In 2013 Senate Bill 43 was signed by Governor Brown. SB 43 enables the IOUs to offer a green tariff "shared solar" program to its ratepayers. SB 43 provides the IOUs with a potentially powerful marketing tool against CCAs.

AB 32: There is potential for cap and trade funding for infrastructure projects related to transportation that could offset the reduction in gas tax received if EV infrastructure development is a priority for Sonoma County. The California State Association of Counties is supporting a proposal to direct the share of cap and trade revenues

[35] http://www.cpuc.ca.gov/PUC/energy/electric/storage.htm

associated with the transportation sector (40% of funds, which come into the market in 2015) back to investments in transportation. In addition, CSAC & Sonoma County are making progress on funding for local governments from cap and trade, also a potential funding source for SCP projects.

Renewable Portfolio Standard:[36] This is a well-known requirement. SCP, like the IOUs, is required to comply. It is ahead of the game on this one, planning to launch in 2014 at the 2020 mandate of 33%.

Resource Adequacy:[37] All CA load serving entities (LSEs) are required to prove that they have procured resources sufficient to serve their load with a margin of error. There is tremendous opportunity for total cost reduction resulting from measured and verified reductions in resource requirements. The existing electric system has an average load factor of 55%. That means 45% of what ratepayers buy is wasted, due mainly to the antique grid being both dumb and blind. SCP can and should address this fact.

Proposition 39 – Prop 39 raises several hundred million dollars per year that is dedicated to energy efficiency and renewable energy at schools and other public facilities.

Prospective Legislation banning organics in landfills: There is some expectation that the state legislature may enact a landfill ban in 2014 on organic waste from commercial generators (larger businesses & restaurants). If it happens there will be a large feedstock of organic waste that will have to be diverted from landfills and either composted or used to make renewable energy through anaerobic digestion.

iii. Additional Resources

CCA Resources

California Public Utilities Commission
http://www.cpuc.ca.gov/PUC/energy/Retail+Electric+Markets+and+Finance/070430_ccaggregation.htm

Local Energy Aggregation Network

[36] http://www.cpuc.ca.gov/PUC/energy/Renewables/
[37] http://www.cpuc.ca.gov/PUC/energy/Procurement/RA/

www.leanenergyus.org

Local Power, Inc.
www.localpower.com

Marin Energy Authority
www.marinenergyauthority.org

Pacific Gas & Electric
http://www.pge.com/cca/

Grid Modernization Resources:

California Public Utilities Commission
http://www.cpuc.ca.gov/PUC/energy/smartgrid.htm

Perfect Power Institute
http://www.perfectpowerinstitute.org/

Smart Grid News
http://www.smartgridnews.com/

U.S. Dept. of Energy
http://www.smartgrid.gov/

Financing Resources

California Alternative Energy and Advanced Transportation Financing Authority
http://www.treasurer.ca.gov/caeatfa/

California Infrastructure and Economic Development Bank (I-Bank)
http://www.ibank.ca.gov/

Clean Energy Finance Center
http://www.cleanenergyfinancecenter.org/

National Renewable Energy Lab, Renewable Energy Project Finance Page

https://financere.nrel.gov/finance/

Sonoma County Energy Independence Program
http://www.sonomacountyenergy.org/

U.S. EPA Clean Energy Financing Programs Page
http://epa.gov/statelocalclimate/state/activities/financing.html

Other

Renewables100 Institute
http://www.renewables100.org/

iv. Acknowledgments

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